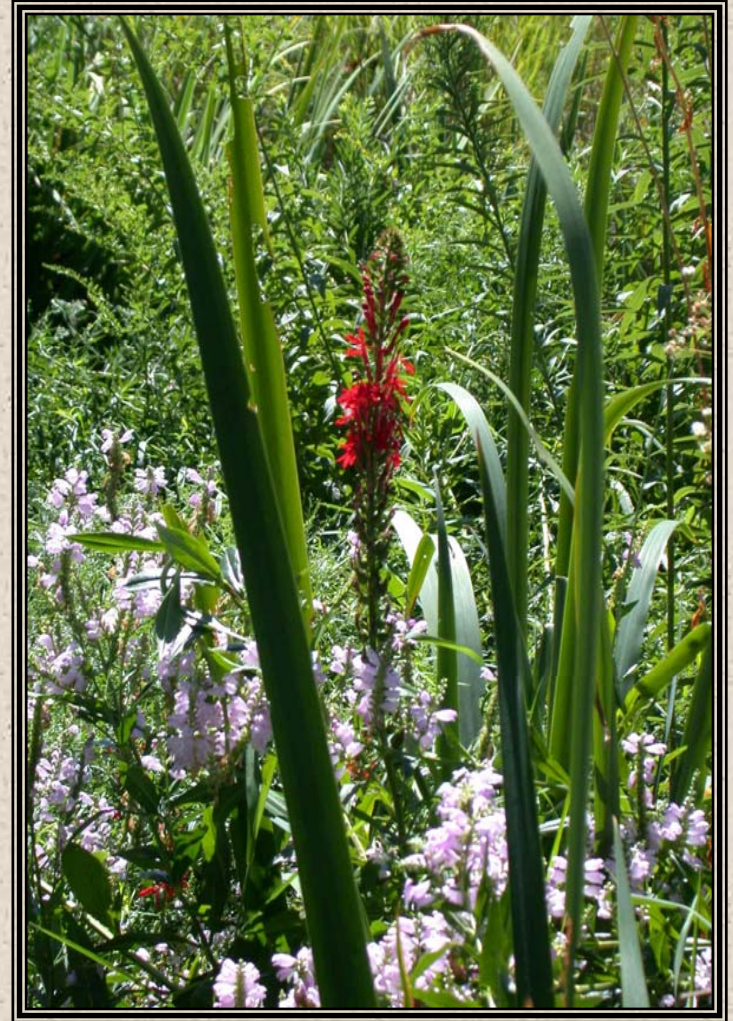


Indiana Brownfields Conference 2006

Bridging Economic Development and
Environmental Protection

Turning Brownfields Into Greenfields

April 12, 2006





Talk Outline

- Review BMPs; specifically the use of natural vegetation
- Briefly look at why these systems work
- Review case study examples and results



WHAT ARE BEST MANAGEMENT PRACTICES (BMPs)?



Definitions:

Combination of management, cultural and structural practices that provide the most effective and economical means of stormwater management.

A structural or non-structural device designed to temporarily store or treat urban stormwater runoff in order to mitigate flooding, reduce pollution, and provide other amenities.



Natural Vegetation BMPs

- Wetland basins
- Wetlands
- Vegetated swales
- Pond buffers
- Green roof systems
- Infiltration enhancement





Benefits of Using Native Plants

- Drought & disease resistant
- Require little maintenance once established
- Many are long-lived perennials
- Attract butterflies, hummingbirds, songbirds & beneficial insects
- Help to restore plant diversity
- They're often hardier than their non-native, cultivated cousins
- Help stabilize and restore soil





Royal Catchfly



Yellow Coneflower



Pickerel Weed



Sunflower



Butterfly Weed



Blazing Star



**Blue Flag
Iris**



Cardinal Flower



**Swamp
Milkweed**



Bergamot



Mountain Mint



Black-eyed Susan



Big Bluestem



WETLAND BASINS





INFILTRATION ENHANCEMENT





Porous Pavement

Description/Purpose

- Porous pavement is a structural cover with regularly distributed void spaces located over a thick base of coarse gravel. The top layer is typically one of two types: a bituminous or concrete mixture without the fine aggregate or a layer of prefabricated interlocking blocks.



Criteria

- Areas of use should be medium to small in size and relatively flat. Subsoil layers will determine infiltration capabilities of the pavement.

Effects on Stormwater

- Porous pavement can be used to mitigate the impervious nature of typical paved areas. Rainfall can pass through the top layer and into the aggregate below. Some storage is provided and infiltration into the soil.







Rain Gardens

Description/Purpose

- An area in the landscape graded to force the ponding of stormwater runoff. Stormwater collects in these shallow depressions and is retained and infiltrated into the soil.

Criteria

- Depressions can be used on most sites and should be located within surface areas that concentrate flows and collect runoff. Soils must have minimum infiltration capacity to avoid prolonged standing water. Infiltration rates are greatly enhanced with use of native plant species. Refer to Ecoregional genotypes. Mesic prairie depressions are considered a structural ASMP.

Effects on Stormwater

- Depressions collect and retain small amounts of stormwater runoff and this has the effect of reducing runoff amounts and slowing the rate of runoff. Collected stormwater subsequently infiltrates into the soil.





Rain Gardens







VEGETATED PONDS









GREEN ROOF SYSTEMS





Chicago City Hall Green Roof



Ford Motor
Company



Commercial
Building, Germany



Hotel Roof,
British Columbia



Why do Natural Systems Work?

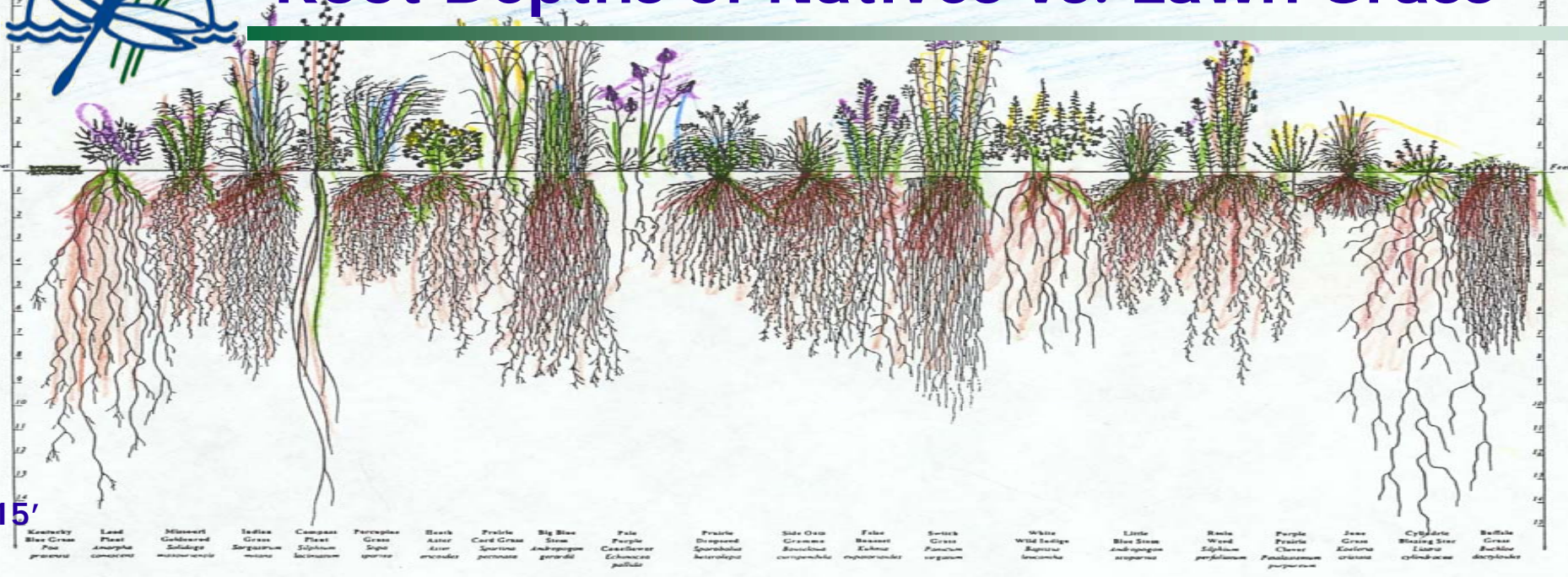


- Interaction/contact between pollutants in water and the plant and soil media of the systems
- Biological degradation
- Filtration
- Wetlands are nature's kidneys

A True Power Plant The Root Of The Matter



Root Depths of Natives vs. Lawn Grass



Land Management Options

Pasture and Row Crops

Un-Pastured Native Grasses

Mature Trees

Infiltration Rates (in./hr.)

1 - 3

7 - 13

10 - 14

Information based on Iowa State University study of fully mature systems



Summary - BMP Benefits

		Percent Pollutant Removal (%)							
		P	Metals (Cu, Zn, Pb)	N	TSS	BOD	Organics	Bacteria	Hydro - carbon
Rain Gardens		60	90	60	30-90	-	90	90	-
Infiltration Drainfield		65	-	85	80-95	-	-	-	-
Infiltration Trench		60	90	60	90	70-80	90	90	-
Infiltration Basin		60	90	60	30-90	-	90	90	-
Porous Pavers		30-60	-	30-60	30-60	-	-	-	50+
Vegetated Swale		20-65	40-90	40-50	80-90	67	-	-	65
Bioretention Basin		65-85	80-98	50-80	90	-	90	90	-
Constructed Wetlands		50	41-62	28	67	-	34	77	87
Greenroofs		65	95	80	-	-	-	-	-
Retention Pond		50	50	30	80	-	-	50	-



Turf to Prairie Conversion

Total Cost Savings for 11 acre Prairie Conversion from Turf

	3-Year	5-Year	10-Year
Prairie Cost	\$ 86,500	\$ 99,500	\$109,500
Turf Cost	\$108,900	\$181,500	\$363,000
Total Cost Savings	\$ 22,400	\$ 82,000	\$253,500



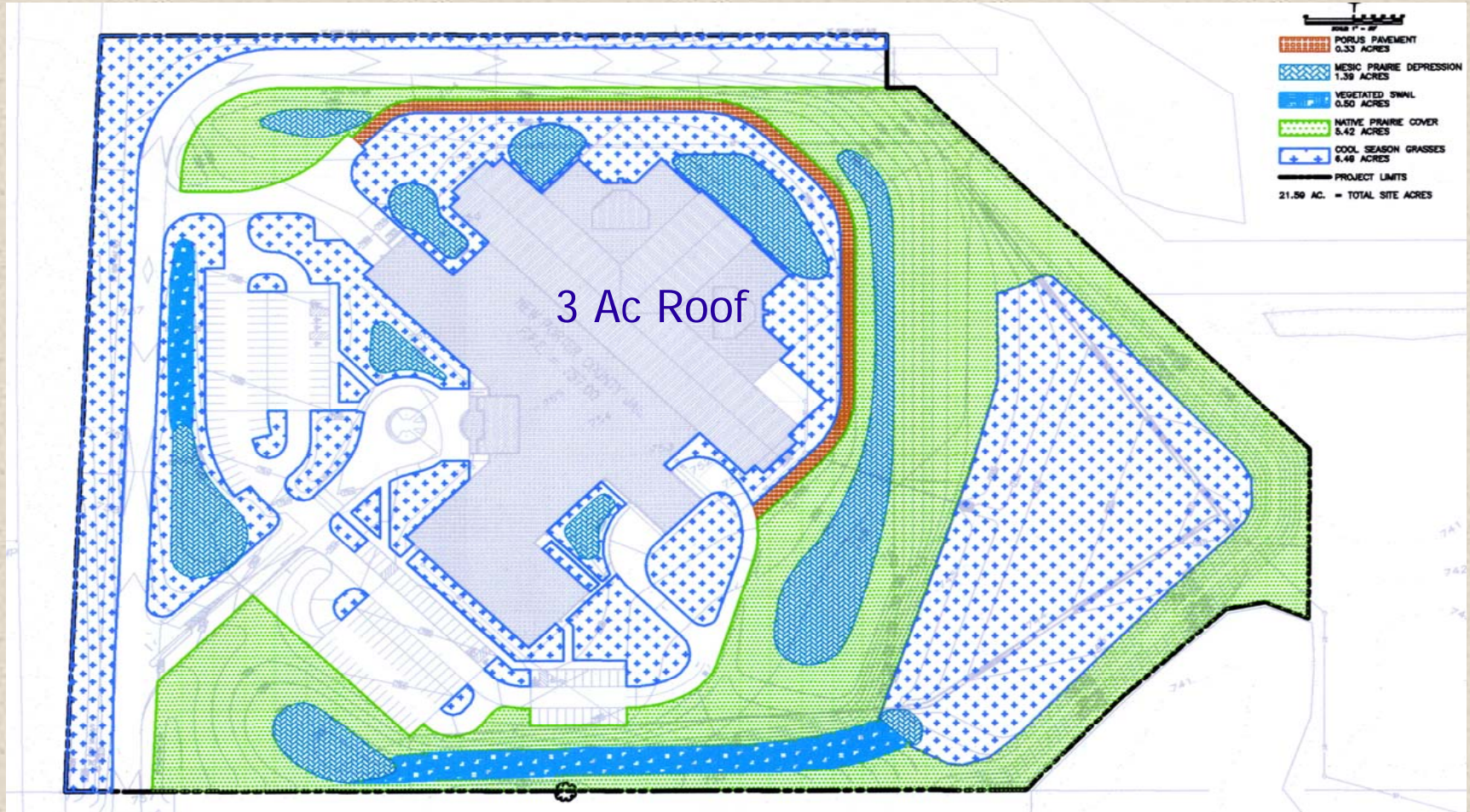
Case Study Site

Porter County Jail Site

- Drainage Area (21.59 Acres).
- Pre-Development Condition (CN = 82).
- Post-Development Condition (Composite CN = 89).
- Volume of runoff from impervious areas (7.79 acres) that was required to be infiltrated (0.88 acre-feet).



Case Study Site





Case Study Site

Results of Using BMPs - Predicted

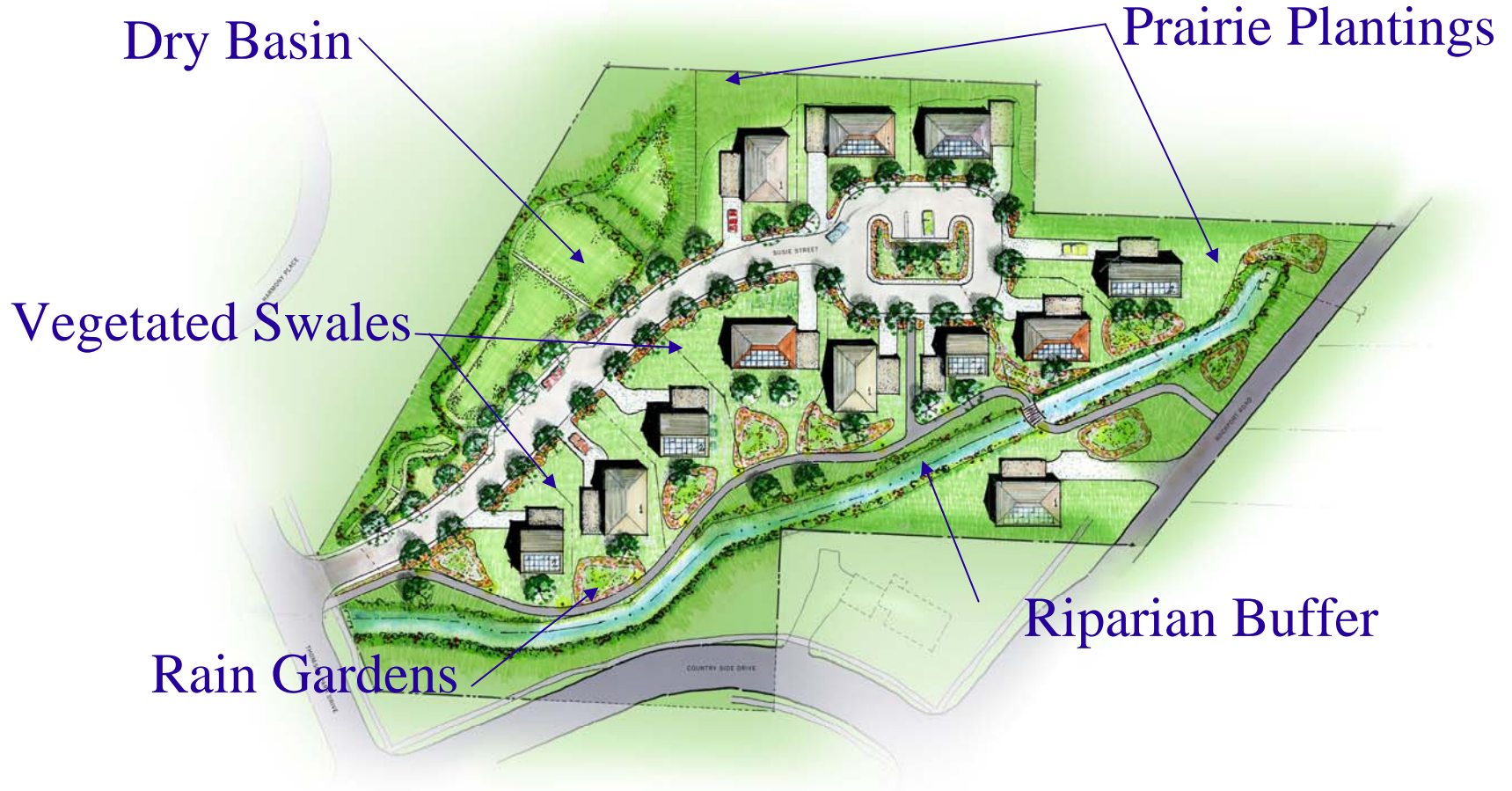
- Pre-development runoff volume (1.29 inches=2.32 acre-ft)
- Post-development runoff volume using the proposed BMPs (0.72 inches = 1.29 acre-feet).
- Reduction in runoff volume (0.57 inches = 1.03 acre-feet) or **44%**.
- Rain Garden (storage) provided on site:
 - area = 1.36 acres
 - average depth of water = 7.6 inches
 - infiltration time at 0.5 inches per hour= 15 hours



Case Study Site



Example Low Impact Development





Understand the Marketing





USGBC LEED Points

Sustainable Sites

- Credit 5.1, Protect/Restore open space – **1 point (Create/Restore Wetlands and Prairies)**
- Credit 5.2, Reduced Site Disturbance Development Footprint – **1 point (Avoid and minimize impacts to natural resources onsite: Conservation Design)**
- Credit 6.1, Stormwater Management Rate and Quantity – **1 point (Utilize NTS)**
- Credit 6.2, Stormwater Treatment – **1 point (Utilize NTS)**
- Credit 7.2, Green Roof – **1 point (Utilize Native plants for Green Roofs)**

Water Efficiency

- Credit 1.1, Water Efficient landscaping – **1 point (Utilize Drought Tolerant Natives that do not require irrigation)**
- Credit 1.2, Water Efficient Landscaping – **1 point (Utilize Natives)**
- Credit 2, Innovative Wastewater Technologies – **1 point (Utilize Wastewater Wetlands)**





Wrap Up and Open Discussion

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